भारतीय मानक
Indian Standard

IS 1873 : 2019

विमानों में उपयोग हेतु सेलुलोज़ नाइट्रेट आधारित रंग रोग़न, डोप्स और लाख के लिए शीत प्रतिरोधी थिंनर — विशिष्टि

(पहला पुनरीक्षण)

Antichill Thinner for Cellulose Nitrate Based Paints, Dopes and Lacquers for Aircrafts — Specification

(First Revision)

ICS 87.060.30

© BIS 2019

भारतीय मानक ब्यूरो
BUREAU OF INDIAN STANDARDS
मानक भवन, 9 बहादुरशाह ज़फर मार्ग, नई दिल्ली – 110002
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG
NEW DELHI-110002
www.bis.gov.in www.standardsbis.in

April 2019 **Price Group 2**

Raw materials for paints, varnishes and related products Sectional Committee, CHD 21

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Raw materials for paints, varnishes and related products Sectional Committee, had been approved by the Chemical Division Council.

This standard was first published in 1961. Antichill thinners for cellulose nitrate based paints, dopes and lacquers, vary in composition from one manufacturer to another. With the increase in the import of various new types of aircraft, requiring new types of paints, dopes and lacquers to pace with the growth of the aircraft manufacturing industry in this country, thus need for evolving a suitable standard to serve the special requirements of thinner used in this industry was felt by the Committee responsible for formulation of this standard. This specification is intended to serve as a guide in evaluating the quality of this type of thinner required by the aircraft industry.

Raw material for paint products may contain lead and other heavy and toxic metals either because of use as catalyst or their compounds being essential adjunct of formulation in manufacturing of paints. Taking cognizance of the fact that lead and toxic heavy metal exposure of human being, particularly children in residential premises is injurious to health and having adverse impact on human health and safety, the Committee responsible for formulation of this standard has felt the need to introduce restriction of lead and toxic heavy metal restriction in all paint raw material product standards. Revision of this standard has been taken up with a view to incorporate the maximum permissible limit of lead and heavy metal restriction clause in this standard. Therefore, in this revision, lead restriction up to a maximum permissible limit of 90 ppm and toxic heavy metals restriction (cumulative other than lead) as 0.1 percent maximum has been prescribed to avoid hazardous impact of lead and heavy metal exposure and consequent adverse impact on environment and human health. Further, majority of consumers are not aware of the consequences of lead and other heavy metal toxicity and its long-term implications to human health. Therefore, in this revision, along with lead and heavy metal restriction, a suitable cautionary notice has been included in the marking clause. The title of the standard has also been slightly modified for better understanding.

Besides above changes, all amendments have been amalgamated.

This standard is one of a series of Indian Standards for aircraft paint and varnish materials. The other Indian Standard Specifications in this series are:

IS 1872	Thinner for synthetic paints and varnishes for aircrafts

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 1960 ‘Rules for rounding off numerical values (*revised*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

ANTICHILL THINNER FOR CELLULOSE NITRATE BASED PAINTS, DOPES AND LACQUERS FOR AIRCRAFTS — SPECIFICATION

(First Revision)

1 SCOPE

This specification prescribes the requirements, sampling and the methods of test for antichill thinner for cellulose nitrate based paints, dopes and lacquers. The thinner is intended for use in the aircraft industry, especially under conditions of high humidity.

2 REFERENCES

The Indian Standards listed in Annex A contain provisions which through reference in this text, constitute provision of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated in Annex A. Wherever a reference to any Indian Standard appears in this specification, it shall be taken as a reference to the latest version of the Standard.

3 TERMINOLOGY

For the purpose of this specification, the definitions given in IS 1303 shall apply.

4 REQUIREMENTS

4.1 Description

The material shall consist only of organic solvent and shall be clear and free from sediment and suspended matter.

4.1.1 The material shall consist of the ingredients mixed in the proportions by volume prescribed against each are as follows:

a) *n*-Butyl acetate (conforming to IS 230)	40 percent
b) Toluene, pure, nitration grade (conforming to IS 537)	25 percent
c) Amyl acetate (conforming to IS 231) or n-butylacetate	10 percent
d) n-Butyl alcohol (conforming to IS 361)	25 percent

4.2 Odour

The material shall leave no appreciable odour after drying on filter paper.

4.3 Spot Test

The material shall show complete evaporation from filter paper without leaving a stain or oily spot.

4.4 Lead Restriction

The material shall be tested for restriction from lead in accordance with IS 101 (Part 8/Sec 5), or by Atomic Absorption Spectrometer (AAS) or by ICP. When thus tested the material shall not contain lead or compounds of lead or mixtures of both, calculated as metallic lead exceeding 90 ppm (*see* Note).

NOTE — When no lead is used during production (lead free).

4.5 Toxic Heavy Metal Restriction

Product shall not be manufactured using mercury and mercury compounds, cadmium, chromium VI, arsenic, antimony and their oxides. The material shall not contain more than 0.1 percent by weight in total of above toxic heavy metals in the form of natural impurities or impurities entailed by the production process which are contained in the raw material, when tested by the relevant Atomic Absorption Spectroscopic methods or by ICP method.

4.6 The material shall also conform to the requirements given in Table 1.

5 KEEPING QUALITY

The keeping qualities shall be such that when stored under cover in a dry place in the original containers under normal temperature conditions, the material shall retain the original characteristics like colour, odour, specific gravity, acidity, copper corrosion and residue on evaporation for not less than 12 months after the date of manufacture.

Table 1 Requirements of Antichill Thinner for Cellulose Nitrate Based Paints, Dopes and lacquers for Aircrafts

(*Clause* 4.6)

Sl No.	Characteristics	Requirement	Method of Test
(1)	(2)	(3)	(4)
i)	Colour	It shall be not darker than a freshly prepared solution of 0.003 g of potassium dichromate in one litre of distilled water	**5** of IS 82
ii)	Specific Gravity At 30°/30°C	0.843 to 0.856	**6** of IS 82
iii)	Distillation Test:		
	a) Initial boiling point, *Min*	100°C	
	b) Volume of distillate up to 121°C	90 ml	**7** of IS 82
	c) Volume of distillate up to 128°C (or volume up to 135°C, if amyl accetate is used)	98 ml	
iv)	Acidity: Percent by weight, (calculated as acetic acid), *Max*	0.01	Annex B
v)	Ester Content, Percent by weight (calculated as butyl acetate), *Min*	46	Annex C
vi)	Residue on Evaporation, *Max*	20 mg per 100 ml	**8** of IS 82
vii)	Copper Corrosion	The material shall not blacken or corrode clean metallic copper	**11** of IS 82
viii)	Hydrocarbon Content, Percent by weight, *Max*	25	Annex D

6 PACKING AND MARKING

6.1 Packing

6.1.1 Unless otherwise agreed to between the purchaser and the supplier, the material shall be packed in tins containers conforming to IS 1406.

6.1.2 All containers for storage and transport of the material, since classified as inflammable and dangerous goods, shall, in addition, comply with the requirements of the latest issue of red tariff and the requirements as laid down from time to time by the Petroleum and Explosives Safety Organization (PESO),Government of India, for packing, storage and transit of Inflammable Liquids and the Board of Trade Regulations as applicable thereon for transport by steamers.

6.2 Marking

6.2.1 The containers shall be securely closed and marked with following details:

a) Name of the material;
b) Manufacturer’s name and trade-mark, if any;
c) Lead content (maximum);
d) Toxic heavy metals content;
e) Volume of the material;
f) Batch number or lot number in code or otherwise;
g) Month and year of manufacture; and
h) A cautionary note as below:
   1) Keep out of reach of children.
   2) This product may be harmful if swallowed or inhaled.

6.2.2 The containers shall also be marked ‘HIGHLY INFLAMMABLELIQUID’ in clearly legible and bold red letters and flash point of the material.

6.2.3 *BIS Certification Marking*

The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.

7 SAMPLING

7.1 The supplier shall submit the necessary tender samples packed indifferent containers, each sample in duplicate and each containing not less than 500 ml of the material.

7.2 Representative sample of bulk supplies of the material shall be drawn as prescribed under **3** of IS 82.

ANNEX A

(*Clause* 2)

LIST OF REFERRED INDIAN STANDARDS

IS No.	*Title*
82 : 1973	Method of sampling and test for thinners and solvent for paints
101 (Part 8/Sec 5) : 1993	Methods of sampling and test for paints, varnishes and related products: Part 8 Tests for pigments and other solids, Section 5 Lead restriction test
230 : 1972	Normal butyl acetate
231 : 1957	Amyl acetate
266 : 1993	Sulphuric acid
323 : 2009	Rectified spirit for industrial use
361 : 2009	Normal butyl alcohol, technical
537 : 2011	Toluene specification
878 : 2008	Laboratory glassware — Graduated measuring cylinders
1070 : 1992	Reagent grade water
1303 : 1983	Glossary of terms relating to paints
1406 : 1995	Rectangular tins for liquids

ANNEX B

[*Table* 1, *Item* (iv)]

DETERMINATION OF ACIDITY

B-1 REAGENTS

B-1.1 Rectified Spirit — Conforming to IS 323.

B-1.2 Phenolphthalein Indicator Solution

Dissolve 0.5 g of phenolphthalein in 100 ml of rectified spirit.

B-1.3 Standard Sodium Hydroxide Solution — 0.1 N.

B-2 PROCEDURE

Weigh accurately about 50 g of the sample and mix with 50 ml of rectified spirit previously neutralized to phenolphthalein and titrate the mixture with standard sodium hydroxide solution using 0.5 ml of phenolphthalein indicator solution.

B-3 CALCULATION

Calculate acidity as follows:

Acidity (as acetic acid), percent by weight

$$= \frac{V \times N \times 0.06}{W} \times 100$$

Where,

V = Volume in ml, of standard sodium hydroxide solution used in the titration;

N = Normality of standard sodium hydroxide solution; and

W = Weight in g, of the sample.

ANNEX C

[*Table* 1, *Item* (v) **]**

DETERMINATION OF ESTER CONTENT

C-1 REAGENTS

C-1.1 Standard Alcoholic Potassium Hydroxide Solution — 1 N.

C-1.2 Phenolphthalein Indicator Solution — Dissolve 0.5 g of phenolphthalein in 100 ml of rectified spirit (conforming to IS 323).

C-1.3 Standard Hydrochloric Acid — 1 N.

C-2 PROCEDURE

C-2.1 In a 250 ml conical flask with ground-glass stopper, take 50 ml of standard alcoholic potassium hydroxide solution. Close the flask with glass stopper. Transfer approximately 3 g of the sample, weighed accurately, into the flask.

C-2.2 Fit a ground-glass air condenser and heat the flask for one hour in aboiling water-bath. Withdraw the flask, still carrying the condenser and immerse in cold water. When cool, wash down the inside of the condenser with two 20 ml portions of distilled water. Disconnect the flask and wash each joint with a further 20 ml of distilled water. Add 0.5 ml of phenolphthalein indicator solution and titrate immediately with standard hydrochloric acid, until the pink colour is discharged for the first time.

C-2.3 Carry out a blank determination simultaneously, using the same quantity of standard alcoholic potassium hydroxide solution.

C-3 CALCULATION

C-3.1 Calculate the ester content as follows:

Ester content (as butyl acetate), percent by weight,

$$= \frac{(V_1 - V_2) \times 11.6}{W}$$

where

V_1 = Volume in ml, of standard hydrochloric acid required for blank determination;

V_2 = Volume in ml, of standard hydrochloric acid used in the determination with the test sample;

N = Normality of standard hydrochloric acid; and

W = Weight in g, of the sample.

ANNEX D

[*Table* 1, *Item* (viii)]

DETERMINATION OF HYDROCARBON CONTENT

D-1 QUALITY OF REAGENTS

Unless specified otherwise, pure chemicals and distilled water (*see* IS 1070) shall be employed in tests.

NOTE — 'Pure chemicals' shall mean chemicals that do not contain impurities which affect the results of analysis.

D-2 APPARATUS

D-2.1Stoppered Graduated Measuring Cylinder — 100 ml capacity (*See* IS 878).

D-3 REAGENTS

D-3.1 Sulphuric Acid — Mix 60 ml of concentrated sulphuric acid (*see* IS 266) and 40 ml of water.

D-4 PROCEDURE

Transfer 50 ml of the thinner sample in the measuring cylinder. To this add 50 ml of sulphuric acid previously cooled with ice and mix thoroughly. Allow the contents of the cylinder to stand undisturbed overnight or until the mixture separates into two distinct layers. The top layer insoluble in sulphuric acid consists of the hydrocarbons. Carefully record the volume of the upper layer and determine its specific gravity.

D-5 REPORTING

From the volume of the insoluble hydrocarbon portion and the volume of the samples compute the percentage by weight of hydrocarbon content.

Bureau of Indian Standards

BIS is a statutory institution established under the *Bureau of Indian Standards Act*, 2016 to promote harmonious development of the activities of standardization, marking and quality certification of goods and attending to connected matters in the country.

Copyright

BIS has the copyright of all its publications. No part of these publications may be reproduced in any form without the prior permission in writing of BIS. This does not preclude the free use, in the course of implementing the standard, of necessary details, such as symbols and sizes, type or grade designations. Enquiries relating to copyright be addressed to the Director (Publications), BIS.

Review of Indian Standards

Amendments are issued to standards as the need arises on the basis of comments. Standards are also reviewed periodically; a standard along with amendments is reaffirmed when such review indicates that no changes are needed; if the review indicates that changes are needed, it is taken up for revision. Users of Indian Standards should ascertain that they are in possession of the latest amendments or edition by referring to the latest issue of 'BIS Catalogue' and 'Standards: Monthly Additions'.

This Indian Standard has been developed from Doc No.: CHD 21 (12859).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

BUREAU OF INDIAN STANDARDS

Headquarters:

Manak Bhavan, 9 Bahadur Shah Zafar Marg, New Delhi 110002
Telephones: 2323 0131, 2323 3375, 2323 9402 *Website*: www.bis.gov.in

Regional Offices: *Telephones*

Central : Manak Bhavan, 9 Bahadur Shah Zafar Marg
NEW DELHI 110002
{ 2323 7617
{ 2323 3841

Eastern : 1/14 C.I.T. Scheme VII M, V.I.P. Road, Kankurgachi
KOLKATA 700054
{ 2337 8499, 2337 8561
{ 2337 8626, 2337 9120

Northern : Plot No. 4-A, Sector 27-B, Madhya Marg
CHANDIGARH 160019
{ 265 0206
{ 265 0290

Southern : C.I.T. Campus, IV Cross Road, CHENNAI 600113
{ 2254 1216, 2254 1442
{ 2254 2519, 2254 2315

Western : Manakalaya, E9 MIDC, Marol, Andheri (East)
MUMBAI 400093
{ 2832 9295, 2832 7858
{ 2832 7891, 2832 7892

Branches : AHMEDABAD. BENGALURU. BHOPAL. BHUBANESHWAR. COIMBATORE. DEHRADUN. DURGAPUR. FARIDABAD. GHAZIABAD. GUWAHATI. HYDERABAD. JAIPUR. JAMMU. JAMSHEDPUR. KOCHI. LUCKNOW. NAGPUR. PARWANOO. PATNA. PUNE. RAIPUR. RAJKOT. VISAKHAPATNAM.

Published by BIS, New Delhi